CHOOSE THE LETTER THAT BEST ANSWERS EACH OF THE STATEMENTS BELOW:

1. All of the following statements about the axon shaft are true EXCEPT:
   A. axonal diameter influences conduction velocity of the action potential
   B. ion channels are clustered at nodes of Ranvier
   C. it contains parallel arrays of neurofilaments and microtubules
   D. it may be ensheathed by nonmyelinating glia
   E. the length constant is inversely proportional to the axon diameter

2. Which of the following statements about astrocytes is TRUE:
   A. they form myelin in the central nervous system
   B. they produce large amounts of collagen in the central nervous system
   C. they participate in forming the blood-brain barrier
   D. they can be phagocytic in function
   E. protoplasmic astrocytes are found in white matter

3. The most common excitatory transmitter in the central nervous system is:
   A. acetylcholine
   B. glutamate
   C. glycine
   D. serotonin
   E. GABA

4. Transmitters are inactivated at synapses by all of the following mechanisms EXCEPT:
   A. diffusion out of the synaptic gap
   B. enzymatic breakdown
   C. re-uptake by the presynaptic terminal
   D. uptake by astrocytes that ensheath the synapse
   E. uptake by oligodendrocytes

5. All of the following statements about metabotropic receptors are true EXCEPT:
   A. they contain an ion channel
   B. they can cause tyrosine phosphorylation
   C. they contain a ligand binding site
   D. they contain a cytoplasmic catalytic site
   E. they are often linked to G-proteins

6. Rupture of the middle meningeal artery was a likely cause of the recent death of a 14-year old boy who suffered a fatal blow to the temporal region of the skull. The cause of death would result most likely from:
   A. communicating hydrocephalus
   B. epidural hematoma
   C. subdural hematoma
   D. subarachnoid hemorrhage
   E. non-communicating hydrocephalus
7. The most common location where blockage of CFS flow results in hydrocephalus is:
   A. interventricular foramen of Monro
   B. choroid plexus
   C. cerebral aqueduct
   D. lateral foramen of Luschka
   E. cisterna magna

8. The decussation (crossing) of the medial lemniscus (internal arcuate fibers) is located in the:
   A. spinal cord
   B. medulla
   C. pons
   D. midbrain
   E. diencephalon

9. Axons of which of the following tracts cross from one side of the nervous system to the other:
   A. ascending root of V
   B. fasciculus cuneatus
   C. dorsolateral fasciculus
   D. ventral trigeminothalamic tract
   E. spinal tract of V

10. Cell bodies that give rise to the lateral spinothalamic tract axons are located in the:
    A. apical region of the dorsal horn
    B. substantia gelatinosa
    C. nucleus proprius
    D. all of the above
    E. A and C

11. Damage to the lateral spinothalamic tract at T12 on the LEFT side would result in a loss of some sensation:
    A. from the entire leg on the right side
    B. from the entire leg on the left side
    C. from the knee down on the right side
    D. from the umbilicus down on the right side
    E. from the umbilicus down on the left side

12. A patient with loss of pain and temperature sensation on the RIGHT face and the LEFT body has a lesion in:
    A. right postcentral gyrus
    B. medial part of the rostral medulla on the right
    C. lateral part of the rostral medulla on the right
    D. right trigeminothalamic tract
    E. lateral part of the rostral pons on the left
13. Chronic pain is transmitted more slowly than acute pain because chronic pain signals are carried by:
   A. C fibers  
   B. myelinated axons  
   C. A delta fibers  
   D. B fibers  
   E. larger diameter axons

14. A lesion of the ventral trigeminothalamic tract at the level of the midbrain on one side would result in:
   A. loss of only pain and temperature sensation on the ipsilateral face  
   B. loss of pain, temperature, and touch sensation on the ipsilateral face  
   C. loss of pain, temperature, and touch sensation on the contralateral face  
   D. paralysis of jaw muscles on the contralateral side  
   E. loss of only touch sensation on the contralateral face

15. The spinal trigeminal tract has its origin from neurons located in the:
   A. trigeminal ganglion  
   B. nucleus of the spinal tract of V  
   C. chief sensory nucleus of V  
   D. substantia gelatinosa of C1 to C3  
   E. mesencephalic nucleus of V

1. E  
2. C  
3. B  
4. E  
5. A  
6. B  
7. C  
8. B  
9. D  
10. E  
11. A  
12. C  
13. A  
14. C  
15. A
VISUAL SYSTEM

1. The following reflexes are paired with structures that form part of the reflex pathway. Which one is NOT correct:
   A. jaw jerk reflex : mesencephalic root
   B. dark adaptation : sympathetic trunk
   C. pupillary light reflex : brachium of superior colliculus
   D. corneal reflex : optic tract
   E. accommodation : optic radiations

2. Which of the following statements about the eye is FALSE:
   A. cones are concentrated in the fovea
   B. when the ciliary muscle contracts, the suspensory ligaments relax
   C. a patient with hydrocephalus would most likely also have papilledema
   D. cones are very sensitive to dim illumination
   E. rods are concentrated in the periphery of the retina

3. Which of the following is NOT involved in the pathway for voluntary horizontal conjugate movement of the eyes:
   A. brachium of the superior colliculus
   B. cranial nerve III
   C. MLF
   D. paramedian pontine reticular formation
   E. cranial nerve VI

4. Choose the best answer concerning the retina.
   A. When light strikes a rod photoreceptor, rhodopsin channels open and admit Na⁺ to the outer segment.
   B. In very dim illumination (e.g., moonlight), cone photoreceptors are hyperpolarized.
   C. ON-center ganglion cells fire more action potentials as the stimulus becomes larger and larger, until it fills the whole receptive field.
   D. Ganglion cells with transient responses are common in the retinal periphery.
   E. Both A and B are true.

5. Choose the best answer concerning the normal development of the visual system.
   A. All layers of the cortex contain some binocular cells at birth.
   B. Axons from the lateral geniculate to the visual cortex make and break synaptic connections both before and after birth.
   C. NMDA receptors contribute to stabilization of active synapses by admitting glutamate into dendrites of cortical cells.
   D. Prior to birth, ganglion cells in both eyes fire simultaneously.
   E. Both A and B are true.

6. Choose the best answer concerning the effects of a severe cataract in the left eye at birth.
   A. The cataract should be removed before the axons from the eye first grow into the lateral geniculate.
   B. If the cataract is removed when the child is between 1 and 2 years old, binocular vision will eventually be normal.
   C. Axons from the lateral geniculate on the right side of the brain will eventually occupy much more of layer 4 of the cortex than will axons from the lateral geniculate on the right side of the brain.
   D. If the cataract is not removed until the child is 10 years old, all of the cells in layer 2 of the cortex will respond only to visual input via the right eye.
   E. If the cataract is never removed, axons from left eye will innervate fewer laminae of the lateral geniculate than normal.
The diagram on the left shows lesions in the visual pathways. For the indicated lesions, draw the VISUAL FIELD deficits for the left and right eyes in the places provided and then write the appropriate name (ophthalmic term) that describes the deficit. (2 points ea)

1. D
2. D
3. A
4. D
5. E
6. D